

# SEQUENCE LISTING

<110> Gu, Wei

<120> NOVEL G-PROTEIN COUPLED RECEPTORS AND USES THEREFOR

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<150> 09/556,588

<151> 2000-05-08

<150> 60/132,896

<151> 1999-05-06

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<170> PatentIn Ver. 2.0

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acc tat ggt cag ttc gct gag tat gga gcc cgc tgg gag agc ggt ctg 1920  
Thr Tyr Gly Gln Phe Ala Glu Tyr Gly Ala Arg Trp Glu Ser Gly Leu  
625 630 635 640

ggc tgc cag gct acg ggc ttc ctg gct gtc ctg ggt tca gag gcg tcg 1968  
Gly Cys Gln Ala Thr Gly Phe Leu Ala Val Leu Gly Ser Glu Ala Ser  
645 650 655

gtg ctg ctg ctc aca ctg gcg gcc gtg cag tgc agc atc tct gtg acc 2016  
Val Leu Leu Thr Leu Ala Ala Val Gln Cys Ser Ile Ser Val Thr  
660 665 670

tgc gtc cga gcc tac ggg aag gcg ccg tcg cct ggc agc gtc cgc gca 2064  
Cys Val Arg Ala Tyr Gly Lys Ala Pro Ser Pro Gly Ser Val Arg Ala  
675 680 685

ggc gca ctg gga tgc ctg gcg ctg gcc ggg ctg gcc gca gca ctg ccg 2112  
Gly Ala Leu Gly Cys Leu Ala Leu Ala Gly Leu Ala Ala Ala Leu Pro  
690 695 700

ctg gcc tcg gtg gga gag tat gcc gcc tcc cca ctc tgc ctg ccc tac 2160  
Leu Ala Ser Val Gly Glu Tyr Gly Ala Ser Pro Leu Cys Leu Pro Tyr

705	710	715	720	
gcc cca ccc gag ggc cgg ccg gcc gcc ctg ggc ttc gct gta gcc ctg				2208
Ala Pro Pro Glu Gly Arg Pro Ala Ala Leu Gly Phe Ala Val Ala Leu				
	725	730	735	
gtg atg atg aac tgc ctc tgc ttc ctg gtg gtg gcc ggc gcc tac atc				2256
Val Met Met Asn Ser Leu Cys Phe Leu Val Val Ala Gly Ala Tyr Ile				
	740	745	750	
aag ctc tac tgt gac ctg cca cgg ggt gac ttt gag gcc gtg tgg gac				2304
Lys Leu Tyr Cys Asp Leu Pro Arg Gly Asp Phe Glu Ala Val Trp Asp				
	755	760	765	
tgc gcc atg gtg cgc cac gtg gcc tgg ctc atc ttt gca gat ggc ctc				2352
Cys Ala Met Val Arg His Val Ala Trp Leu Ile Phe Ala Asp Gly Leu				
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ctc tac tgc ccc gtg gcc ttc ctc agc ttt gcc tcc atg ctg ggc ctc				2400
Leu Tyr Cys Pro Val Ala Phe Leu Ser Phe Ala Ser Met Leu Gly Leu				
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ttc cct gtc acc ccc gag gct gtc aag tca gtc ctt ctg gtg gtg ctg				2448
Phe Pro Val Thr Pro Glu Ala Val Lys Ser Val Leu Leu Val Val Leu				
	805	810	815	
cct ctg cct gcc tgc ctc aac cca ctg ctc tac ctg ctc ttc aac cct				2496
Pro Leu Pro Ala Cys Leu Asn Pro Leu Leu Tyr Leu Leu Phe Asn Pro				
	820	825	830	
cac ttc cgg gat gac ctt cgg cgg ctc tgg cca agc cct cgg tcc cca				2544
His Phe Arg Asp Asp Leu Arg Arg Leu Trp Pro Ser Pro Arg Ser Pro				
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ggg ccc cta gcc tac gct gca gcc ggt gag ctg gag aag agc tcc tgc				2592
Gly Pro Leu Ala Tyr Ala Ala Ala Gly Glu Leu Glu Lys Ser Ser Cys				
	850	855	860	
gac tcc acc caa gcg ctg gtg gct ttc tca gat gtg gat ctt att ctg				2640
Asp Ser Thr Gln Ala Leu Val Ala Phe Ser Asp Val Asp Leu Ile Leu				
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gaa gct tct gag gct ggg cag cct cct ggg cta gag acc tat ggc ttc				2688
Glu Ala Ser Glu Ala Gly Gln Pro Pro Gly Leu Glu Thr Tyr Gly Phe				
	885	890	895	
cct tca gtg acc ctc atc tcc cga cat cag ccg ggg gcc acc agg ctg				2736
Pro Ser Val Thr Leu Ile Ser Arg His Gln Pro Gly Ala Thr Arg Leu				
	900	905	910	
gag gga aac cat ttt ata gag tct gat gga acc aag ttt ggg aac cca				2784
Glu Gly Asn His Phe Ile Glu Ser Asp Gly Thr Lys Phe Gly Asn Pro				
	915	920	925	
caa cct ccc atg aag gga gaa ctg ctg ctg aag gca gag gga gcc act				2832
Gln Pro Pro Met Lys Gly Glu Leu Leu Leu Lys Ala Glu Gly Ala Thr				
	930	935	940	

ttg gca ggc tgt ggc tct tcc gtg ggt gga gcc ctc tgg ccc tct ggc 2880  
 Leu Ala Gly Cys Gly Ser Ser Val Gly Gly Ala Leu Trp Pro Ser Gly  
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2901

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 Gly Ile Pro Gly Ser Thr His Ala Ser Val Glu Arg Ser Gln Gly Leu  
 20 25 30

agc ctg ccg gct cat cca gcc tct ctt gct gcc cta gcg gcc tcc aac 145  
 Ser Leu Pro Ala His Pro Ala Ser Leu Ala Ala Leu Ala Ala Ser Asn  
 35 40 45

aca acc gca tct ggg aaa ttg gag ctn gac acc ttc agc cag ctg agc 193  
 Thr Thr Ala Ser Gly Lys Leu Glu Xaa Asp Thr Phe Ser Gln Leu Ser  
 50 55 60

tcc ctg caa gcc ctg gat ctt agc tgg aac gcc atc cgg tcc atc cac 241  
 Ser Leu Gln Ala Leu Asp Leu Ser Trp Asn Ala Ile Arg Ser Ile His  
 65 70 75 80

cct gag gcc ttc tcc acc ctg cac tcc ctg gtc aag ctg gac ctg aca 289  
 Pro Glu Ala Phe Ser Thr Leu His Ser Leu Val Lys Leu Asp Leu Thr  
 85 90 95

gac aac cag ctg acc aca ctg ccc ctg gct gga ctt ggg ggc ttg atg 337  
 Asp Asn Gln Leu Thr Thr Leu Pro Leu Ala Gly Leu Gly Gly Leu Met  
 100 105 110

cat ctg aag ctc aaa ggg aac ctt gct ctc tcc cag gcc ttc tcc aag 385  
 His Leu Lys Leu Lys Gly Asn Leu Ala Leu Ser Gln Ala Phe Ser Lys  
 115 120 125

40650-36360

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Asp Ser Phe Pro Lys Leu Arg Ile Leu Glu Val Pro Tyr Ala Tyr Gln	
130 135 140	
tgc tgt ccc tat ggg atg tgt gcc agc ttc ttc aag gcc tct ggg cag	481
Cys Cys Pro Tyr Gly Met Cys Ala Ser Phe Phe Lys Ala Ser Gly Gln	
145 150 155 160	
tgg gag gct gaa gac ctt cac ctt gat gat gag gag tct tca aaa agg	529
Trp Glu Ala Glu Asp Leu His Leu Asp Asp Glu Glu Ser Ser Lys Arg	
165 170 175	
ccc ctg ggc ctc ctt gcc aga caa gca gag aac cac tat gac cag gac	577
Pro Leu Gly Leu Leu Ala Arg Gln Ala Glu Asn His Tyr Asp Gln Asp	
180 185 190	
ctg gat gag ctc cag ctg gag atg gag gac tca aag cca cac ccc agt	625
Leu Asp Glu Leu Gln Leu Glu Met Glu Asp Ser Lys Pro His Pro Ser	
195 200 205	
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Val Gln Cys Ser Pro Thr Pro Gly Pro Phe Lys Pro Cys Glu Tyr Leu	
210 215 220	
ttt gaa agc tgg ggc atc cgc ctg gcc gtg tgg gcc atc gtg ttg ctc	721
Phe Glu Ser Trp Gly Ile Arg Leu Ala Val Trp Ala Ile Val Leu Leu	
225 230 235 240	
tcc gtg ctc tgc aat gga ctg gtg ctg ctg acc gtg ttc gct ggc ggg	769
Ser Val Leu Cys Asn Gly Leu Val Leu Leu Thr Val Phe Ala Gly Gly	
245 250 255	
cct gcc ccc ctg ccc ccg gtc aag ttt gtg gta ggt gcg att gca ggc	817
Pro Ala Pro Leu Pro Pro Val Lys Phe Val Val Gly Ala Ile Ala Gly	
260 265 270	
gcc aac acc ttg act ggc att tcc tgt ggc ctt cta gcc tca gtc gat	865
Ala Asn Thr Leu Thr Gly Ile Ser Cys Gly Leu Leu Ala Ser Val Asp	
275 280 285	
gcc ctg acc ttt ggt cag ttc tct gag tac gga gcc cgc tgg gag acg	913
Ala Leu Thr Phe Gly Gln Phe Ser Glu Tyr Gly Ala Arg Trp Glu Thr	
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Gly Leu Gly Cys Arg Ala Thr Gly Phe Leu Ala Val Leu Gly Ser Glu	
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Ala Ser Val Leu Leu Leu Thr Leu Ala Ala Val Gln Cys Ser Val Ser	
325 330 335	
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Val Ser Cys Val Arg Ala Tyr Gly Lys Ser Pro Ser Leu Gly Ser Val	
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cga gca ggg gtc cta ggc tgc ctg gca ctg gca ggg ctg gcc gcc gca	1105

Arg Ala Gly Val Leu Gly Cys Leu Ala Leu Ala Gly Leu Ala Ala Ala  
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ctg ccc ctg gcc tca gtg gga gaa tac ggg gcc tcc cca ctc tgc ctg 1153  
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 370 375 380

ccc tac gcg cca cct gag ggt cag cca gca gcc ctg ggc ttc acc gtg 1201  
 Pro Tyr Ala Pro Pro Glu Gly Gln Pro Ala Ala Leu Gly Phe Thr Val  
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gcc ctg gtg atg atg aac tcc ttc tgt ttc ctg gtc gtg gcc ggt gcc 1249  
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tac atc aaa ctg tac tgt gac ctg ccg cgg ggc gac ttt gag gcc gtg 1297  
 Tyr Ile Lys Leu Tyr Cys Asp Leu Pro Arg Gly Asp Phe Glu Ala Val  
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tgg gac tgc gcc atg gtg agg cac gtg gcc tgg ctc atc ttc gca gac 1345  
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ggg ctc ctc tac tgt ccc gtg gcc ttc ctc agc ttc gcc tcc atg ctg 1393  
 Gly Leu Leu Tyr Cys Pro Val Ala Phe Leu Ser Phe Ala Ser Met Leu  
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ggc ctc ttc cct gtc acg ccc gag gcc gtc aag tct gtc ctg ctg gtg 1441  
 Gly Leu Phe Pro Val Thr Pro Glu Ala Val Lys Ser Val Leu Leu Val  
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 Val Leu Pro Leu Pro Ala Cys Leu Asn Pro Leu Leu Tyr Leu Leu Phe  
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aac ccc cac ttc cgg gat gac ctt cgg cgg ctt cgg ccc cgc gca ggg 1537  
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 Asp Ser Gly Pro Leu Ala Tyr Ala Ala Ala Gly Glu Leu Glu Lys Ser  
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tcc tgt gat tct acc cag gcc ctg gta gcc ttc tct gat gtg gat ctc 1633  
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 530 535 540

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 Ile Leu Glu Ala Ser Glu Ala Gly Arg Pro Pro Gly Leu Glu Thr Tyr  
 545 550 555 560

ggc ttc ccc tca gtg acc ctc atc tcc tgt cag cag cca ggg gcc ccc 1729  
 Gly Phe Pro Ser Val Thr Leu Ile Ser Cys Gln Gln Pro Gly Ala Pro  
 565 570 575

agg ctg gag ggc agc cat tgt gta gag cca gag ggg aac cac ttt ggg 1777  
 Arg Leu Glu Gly Ser His Cys Val Glu Pro Glu Gly Asn His Phe Gly



580

585

590

580

aac ccc caa ccc tcc atg gat gga gaa ctg ctg ctg agg gca gag gga 1825  
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595 600 605

595  
tct acg cca gca ggt gga ggc ttg tca ggg ggt ggc ggc ttt cag ccc 1873  
Ser Thr Pro Ala Gly Gly Gly Leu Ser Gly Gly Gly Gly Phe Gln Pro  
610 615 620

610  
tct ggc ttg gcc ttt gct tca cac gtg taaatatccc tccccattct 1920  
Ser Gly Leu Ala Phe Ala Ser His Val  
625 630  
1930

625  
tctcttcccc tctcttccct ttctctcttc cccctcgggtg aatgatggct gcttctaaaa 1980

caaatacaac caaaactcag cagtgtgata tatagcagga tggcccagta cctggctcca 2040

caaatacaac caaaactcag cag-3-3  
ctgatcacct ctctcctgtg accatcacca acgggtgcct cttggcctgg ctttcccttg 2100  
ctatggag 2160

gccttctca gcttcacatt gatactgggc ctcttccttg tcatgtctga agctgtggac 2160

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cagagacctg gacttttgtc tgcttaaggg aaatgagggg agtaaagaca gtgaaggggt 2220  
cagatgagtg gacttttggg gacttttggg gacttttggg gacttttggg gacttttggg 2280

ggaggggttgga tcagggcaca gtggacaggg agacctcaca gagaaaggcc tggaaggtga 2280

tttcccgtgt gactcatgga taggatacaa aatgtgttcc atgtaccatt aatcttgaca 2340

tatgccatgc ataaagactt cctattaaaa taagctttgg aagagattaa aaaaaaaaaa 2400  
ctgctgctgc 2460

aaagggcggc cgctctagag gatccaagct tacgtacgcg tgcatgcgac gtcatagctc 2460  
2486

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35 40 45

Thr Thr Ala Ser Gly Lys Leu Glu Xaa Asp Thr Phe Ser Gln Leu Ser  
50 55 60

Ser Leu Gln Ala Leu Asp Leu Ser Trp Asn Ala Ile Arg Ser Ile His  
 65 70 75 80  
 Pro Glu Ala Phe Ser Thr Leu His Ser Leu Val Lys Leu Asp Leu Thr  
 85 90 95  
 Asp Asn Gln Leu Thr Thr Leu Pro Leu Ala Gly Leu Gly Gly Leu Met  
 100 105 110  
 His Leu Lys Leu Lys Gly Asn Leu Ala Leu Ser Gln Ala Phe Ser Lys  
 115 120 125  
 Asp Ser Phe Pro Lys Leu Arg Ile Leu Glu Val Pro Tyr Ala Tyr Gln  
 130 135 140  
 Cys Cys Pro Tyr Gly Met Cys Ala Ser Phe Phe Lys Ala Ser Gly Gln  
 145 150 155 160  
 Trp Glu Ala Glu Asp Leu His Leu Asp Asp Glu Glu Ser Ser Lys Arg  
 165 170 175  
 Pro Leu Gly Leu Leu Ala Arg Gln Ala Glu Asn His Tyr Asp Gln Asp  
 180 185 190  
 Leu Asp Glu Leu Gln Leu Glu Met Glu Asp Ser Lys Pro His Pro Ser  
 195 200 205  
 Val Gln Cys Ser Pro Thr Pro Gly Pro Phe Lys Pro Cys Glu Tyr Leu  
 210 215 220  
 Phe Glu Ser Trp Gly Ile Arg Leu Ala Val Trp Ala Ile Val Leu Leu  
 225 230 235 240  
 Ser Val Leu Cys Asn Gly Leu Val Leu Leu Thr Val Phe Ala Gly Gly  
 245 250 255  
 Pro Ala Pro Leu Pro Pro Val Lys Phe Val Val Gly Ala Ile Ala Gly  
 260 265 270  
 Ala Asn Thr Leu Thr Gly Ile Ser Cys Gly Leu Leu Ala Ser Val Asp  
 275 280 285  
 Ala Leu Thr Phe Gly Gln Phe Ser Glu Tyr Gly Ala Arg Trp Glu Thr  
 290 295 300  
 Gly Leu Gly Cys Arg Ala Thr Gly Phe Leu Ala Val Leu Gly Ser Glu  
 305 310 315 320  
 Ala Ser Val Leu Leu Leu Thr Leu Ala Ala Val Gln Cys Ser Val Ser  
 325 330 335  
 Val Ser Cys Val Arg Ala Tyr Gly Lys Ser Pro Ser Leu Gly Ser Val  
 340 345 350  
 Arg Ala Gly Val Leu Gly Cys Leu Ala Leu Ala Gly Leu Ala Ala Ala  
 355 360 365

Leu Pro Leu Ala Ser Val Gly Glu Tyr Gly Ala Ser Pro Leu Cys Leu  
370 375 380

Pro Tyr Ala Pro Pro Glu Gly Gln Pro Ala Ala Leu Gly Phe Thr Val  
385 390 395 400

Ala Leu Val Met Met Asn Ser Phe Cys Phe Leu Val Val Ala Gly Ala  
405 410 415

Tyr Ile Lys Leu Tyr Cys Asp Leu Pro Arg Gly Asp Phe Glu Ala Val  
420 425 430

Trp Asp Cys Ala Met Val Arg His Val Ala Trp Leu Ile Phe Ala Asp  
435 440 445

Gly Leu Leu Tyr Cys Pro Val Ala Phe Leu Ser Phe Ala Ser Met Leu  
450 455 460

Gly Leu Phe Pro Val Thr Pro Glu Ala Val Lys Ser Val Leu Leu Val  
465 470 475 480

Val Leu Pro Leu Pro Ala Cys Leu Asn Pro Leu Leu Tyr Leu Leu Phe  
485 490 495

Asn Pro His Phe Arg Asp Asp Leu Arg Arg Leu Arg Pro Arg Ala Gly  
500 505 510

Asp Ser Gly Pro Leu Ala Tyr Ala Ala Ala Gly Glu Leu Glu Lys Ser  
515 520 525

Ser Cys Asp Ser Thr Gln Ala Leu Val Ala Phe Ser Asp Val Asp Leu  
530 535 540

Ile Leu Glu Ala Ser Glu Ala Gly Arg Pro Pro Gly Leu Glu Thr Tyr  
545 550 555 560

Gly Phe Pro Ser Val Thr Leu Ile Ser Cys Gln Gln Pro Gly Ala Pro  
565 570 575

Arg Leu Glu Gly Ser His Cys Val Glu Pro Glu Gly Asn His Phe Gly  
580 585 590

Asn Pro Gln Pro Ser Met Asp Gly Glu Leu Leu Leu Arg Ala Glu Gly  
595 600 605

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Ser Gly Leu Ala Phe Ala Ser His Val  
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195 200 205

gtc cag tgt agc cct act cca ggc ccc ttc aag ccc tgt gag tac ctc 672  
Val Gln Cys Ser Pro Thr Pro Gly Pro Phe Lys Pro Cys Glu Tyr Leu  
210 215 220

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Phe Glu Ser Trp Gly Ile Arg Leu Ala Val Trp Ala Ile Val Leu Leu  
225 230 235 240

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Ser Val Leu Cys Asn Gly Leu Val Leu Leu Thr Val Phe Ala Gly Gly  
245 250 255

cct gcc ccc ctg ccc ccg gtc aag ttt gtg gta ggt gcg att gca ggc 816  
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gcc ctg acc ttt ggt cag ttc tct gag tac gga gcc cgc tgg gag acg 912  
Ala Leu Thr Phe Gly Gln Phe Ser Glu Tyr Gly Ala Arg Trp Glu Thr  
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 305 310 315 320

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340 345 350

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370 375 380

ccc tac gcg cca cct gag ggt cag cca gca gcc ctg ggc ttc acc gtg 1200  
Pro Tyr Ala Pro Pro Glu Gly Gln Pro Ala Ala Leu Gly Phe Thr Val  
385 390 395 400

gcc ctg gtg atg atg aac tcc ttc tgt ttc ctg gtc gtg gcc ggt gcc 1248  
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405 410 415

Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	

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 420 430

tgg gac tgc gcc atg gtg agg cac gtg gcc tgg ctc atc ttc gca gac 1344  
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ggg ctc ctc tac tgt ccc gtg gcc ttc ctc agc ttc gcc tcc atg ctg 1392  
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 Val Leu Pro Leu Pro Ala Cys Leu Asn Pro Leu Leu Tyr Leu Leu Phe  
 485 490 495

aac ccc cac ttc cgg gat gac ctt cgg cgg ctt cgg ccc cgc gca ggg 1536  
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 500 505 510

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 515 520 525

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 545 550 555 560

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 565 570 575

agg ctg gag ggc agc cat tgt gta gag cca gag ggg aac cac ttt ggg 1776  
 Arg Leu Glu Gly Ser His Cys Val Glu Pro Glu Gly Asn His Phe Gly  
 580 585 590

aac ccc caa ccc tcc atg gat gga gaa ctg ctg ctg agg gca gag gga 1824  
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 Ser Thr Pro Ala Gly Gly Gly Leu Ser Gly Gly Gly Gly Phe Gln Pro  
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 gag ttc cct gtg gcc atc cgg acc ctg ggc aga ctg cag gaa ctg ggg 96  
 Glu Phe Pro Val Ala Ile Arg Thr Leu Gly Arg Leu Gln Glu Leu Gly 30  
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 ttc cat aac aac aac atc aag gcc atc cca gaa aag gcc ttc atg ggg 144  
 Phe His Asn Asn Asn Ile Lys Ala Ile Pro Glu Lys Ala Phe Met Gly 45  
 35 40  
 aac cct ctg cta cag acg ata cac ttt tat gat aac cca atc cag ttt 192  
 Asn Pro Leu Leu Gln Thr Ile His Phe Tyr Asp Asn Pro Ile Gln Phe 60  
 50 55  
 gtg gga aga tcg gca ttc cag tac ctg cct aaa ctc cac aca cta tct 240  
 Val Gly Arg Ser Ala Phe Gln Tyr Leu Pro Lys Leu His Thr Leu Ser 80  
 65 70 75  
 ctg aat ggt gcc atg gac atc cag gag ttt cca gat ctc aaa ggc acc 288  
 Leu Asn Gly Ala Met Asp Ile Gln Glu Phe Pro Asp Leu Lys Gly Thr 95  
 85 90  
 acc agc ctg gag atc ctg acc ctg acc cgc gca ggc atc cgg ctg ctc 336  
 Thr Ser Leu Glu Ile Leu Thr Leu Thr Arg Ala Gly Ile Arg Leu Leu 110  
 100 105  
 cca tcg ggg atg tgc caa cag ctg ccc agg ctc cga gtc ctg gaa ctg 384  
 Pro Ser Gly Met Cys Gln Gln Leu Pro Arg Leu Arg Val Leu Glu Leu 125  
 115 120  
 tct cac aat caa att gag gag ctg ccc agc ctg cac agg tgt cag aaa 432  
 Ser His Asn Gln Ile Glu Glu Leu Pro Ser Leu His Arg Cys Gln Lys 140  
 130 135  
 ttg gag gaa atc ggc ctc caa cac aac cgc atc tgg gaa att gga gct 480  
 Leu Glu Glu Ile Gly Leu Gln His Asn Arg Ile Trp Glu Ile Gly Ala 160  
 145 150 155  
 gac acc ttc agc cag ctg agc tcc ctg caa gcc ctg gat ctt agc tgg 528  
 Asp Thr Phe Ser Gln Leu Ser Ser Leu Gln Ala Leu Asp Leu Ser Trp 175  
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 aac gcc atc cgg tcc atc cac cct gag gcc ttc tcc acc ctg cac tcc 576  
 Asn Ala Ile Arg Ser Ile His Pro Glu Ala Phe Ser Thr Leu His Ser

190

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Leu Ala Val Leu Gly Ser Glu Ala Ser Val Leu Leu Leu Thr Leu Ala	
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Ala Val Gln Cys Ser Val Ser Val Ser Cys Val Arg Ala Tyr Gly Lys	
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Ser Pro Ser Leu Gly Ser Val Arg Ala Gly Val Leu Gly Cys Leu Ala	
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Leu Ala Gly Leu Ala Ala Ala Leu Pro Leu Ala Ser Val Gly Glu Tyr	
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Gly Ala Ser Pro Leu Cys Leu Pro Tyr Ala Pro Pro Glu Gly Gln Pro	
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Ala Ala Leu Gly Phe Thr Val Ala Leu Val Met Met Asn Ser Phe Cys	
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Phe Leu Val Val Ala Gly Ala Tyr Ile Lys Leu Tyr Cys Asp Leu Pro	
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Arg Gly Asp Phe Glu Ala Val Trp Asp Cys Ala Met Val Arg His Val	
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Ala Trp Leu Ile Phe Ala Asp Gly Leu Leu Tyr Cys Pro Val Ala Phe	
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Leu Ser Phe Ala Ser Met Leu Gly Leu Phe Pro Val Thr Pro Glu Ala	
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Val Lys Ser Val Leu Leu Val Val Leu Pro Leu Pro Ala Cys Leu Asn	
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Pro Leu Leu Tyr Leu Leu Phe Asn Pro His Phe Arg Asp Asp Leu Arg	
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Arg Leu Arg Pro Arg Ala Gly Asp Ser Gly Pro Leu Ala Tyr Ala Ala	
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Ala Gly Glu Leu Glu Lys Ser Ser Cys Asp Ser Thr Gln Ala Leu Val	
625 630 635 640	

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Ala Phe Ser Asp Val Asp Leu Ile Leu Glu Ala Ser Glu Ala Gly Arg  
645 650 655

ccc cct ggg ctg gag acc tat ggc ttc ccc tca gtg acc ctc atc tcc 2016  
Pro Pro Gly Leu Glu Thr Tyr Gly Phe Pro Ser Val Thr Leu Ile Ser  
660 665 670

tgt cag cag cca ggg gcc ccc agg ctg gag ggc agc cat tgt gta gag 2064  
Cys Gln Gln Pro Gly Ala Pro Arg Leu Glu Gly Ser His Cys Val Glu  
675 680 685

cca gag ggg aac cac ttt ggg aac ccc caa ccc tcc atg gat gga gaa 2112  
Pro Glu Gly Asn His Phe Gly Asn Pro Gln Pro Ser Met Asp Gly Glu  
690 695 700

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Leu Leu Leu Arg Ala Glu Gly Ser Thr Pro Ala Gly Gly Gly Leu Ser  
705 710 715 720

ggg ggt ggc ggc ttt cag ccc tct ggc ttg gcc ttt gct tca cac gtg 2208  
Gly Gly Gly Gly Phe Gln Pro Ser Gly Leu Ala Phe Ala Ser His Val  
725 730 735

taaatatccc tccccattct tctcttcccc tctcttccct ttctctcttc ccctcggtg 2268

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20 25 30

Phe His Asn Asn Asn Ile Lys Ala Ile Pro Glu Lys Ala Phe Met Gly  
35 40 45

Asn Pro Leu Leu Gln Thr Ile His Phe Tyr Asp Asn Pro Ile Gln Phe  
50 55 60

Val Gly Arg Ser Ala Phe Gln Tyr Leu Pro Lys Leu His Thr Leu Ser  
65 70 75 80

Leu Asn Gly Ala Met Asp Ile Gln Glu Phe Pro Asp Leu Lys Gly Thr  
85 90 95

Thr Ser Leu Glu Ile Leu Thr Leu Thr Arg Ala Gly Ile Arg Leu Leu  
100 105 110

Pro Ser Gly Met Cys Gln Gln Leu Pro Arg Leu Arg Val Leu Glu Leu  
115 120 125

Ser His Asn Gln Ile Glu Glu Leu Pro Ser Leu His Arg Cys Gln Lys  
130 135 140

Leu Glu Glu Ile Gly Leu Gln His Asn Arg Ile Trp Glu Ile Gly Ala  
145 150 155 160

Asp Thr Phe Ser Gln Leu Ser Ser Leu Gln Ala Leu Asp Leu Ser Trp  
165 170 175

Asn Ala Ile Arg Ser Ile His Pro Glu Ala Phe Ser Thr Leu His Ser  
180 185 190

Leu Val Lys Leu Asp Leu Thr Asp Asn Gln Leu Thr Thr Leu Pro Leu  
195 200 205

Ala Gly Leu Gly Gly Leu Met His Leu Lys Leu Lys Gly Asn Leu Ala  
210 215 220

Leu Ser Gln Ala Phe Ser Lys Asp Ser Phe Pro Lys Leu Arg Ile Leu  
225 230 235 240

Glu Val Pro Tyr Ala Tyr Gln Cys Cys Pro Tyr Gly Met Cys Ala Ser  
245 250 255

Phe Phe Lys Ala Ser Gly Gln Trp Glu Ala Glu Asp Leu His Leu Asp  
260 265 270

Asp Glu Glu Ser Ser Lys Arg Pro Leu Gly Leu Leu Ala Arg Gln Ala  
275 280 285

Glu Asn His Tyr Asp Gln Asp Leu Asp Glu Leu Gln Leu Glu Met Glu  
290 295 300

Asp Ser Lys Pro His Pro Ser Val Gln Cys Ser Pro Thr Pro Gly Pro  
305 310 315 320

Phe Lys Pro Cys Glu Tyr Leu Phe Glu Ser Trp Gly Ile Arg Leu Ala  
325 330 335

Val Trp Ala Ile Val Leu Leu Ser Val Leu Cys Asn Gly Leu Val Leu  
340 345 350

Leu Thr Val Phe Ala Gly Gly Pro Ala Pro Leu Pro Pro Val Lys Phe  
355 360 365

Val Val Gly Ala Ile Ala Gly Ala Asn Thr Leu Thr Gly Ile Ser Cys  
370 375 380

Gly Leu Leu Ala Ser Val Asp Ala Leu Thr Phe Gly Gln Phe Ser Glu  
385 390 395 400

Tyr Gly Ala Arg Trp Glu Thr Gly Leu Gly Cys Arg Ala Thr Gly Phe  
405 410 415

Leu Ala Val Leu Gly Ser Glu Ala Ser Val Leu Leu Leu Thr Leu Ala  
420 425 430

Ala Val Gln Cys Ser Val Ser Val Ser Cys Val Arg Ala Tyr Gly Lys  
435 440 445

Ser Pro Ser Leu Gly Ser Val Arg Ala Gly Val Leu Gly Cys Leu Ala  
450 455 460

Leu Ala Gly Leu Ala Ala Ala Leu Pro Leu Ala Ser Val Gly Glu Tyr  
465 470 475 480

Gly Ala Ser Pro Leu Cys Leu Pro Tyr Ala Pro Pro Glu Gly Gln Pro  
485 490 495

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Phe Leu Val Val Ala Gly Ala Tyr Ile Lys Leu Tyr Cys Asp Leu Pro  
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Arg Gly Asp Phe Glu Ala Val Trp Asp Cys Ala Met Val Arg His Val  
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Ala Trp Leu Ile Phe Ala Asp Gly Leu Leu Tyr Cys Pro Val Ala Phe  
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Leu Ser Phe Ala Ser Met Leu Gly Leu Phe Pro Val Thr Pro Glu Ala  
565 570 575

Val Lys Ser Val Leu Leu Val Val Leu Pro Leu Pro Ala Cys Leu Asn  
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Pro Leu Leu Tyr Leu Leu Phe Asn Pro His Phe Arg Asp Asp Leu Arg  
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Arg Leu Arg Pro Arg Ala Gly Asp Ser Gly Pro Leu Ala Tyr Ala Ala  
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Ala Gly Glu Leu Glu Lys Ser Ser Cys Asp Ser Thr Gln Ala Leu Val  
625 630 635 640

Ala Phe Ser Asp Val Asp Leu Ile Leu Glu Ala Ser Glu Ala Gly Arg  
645 650 655

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Pro Ser Gly Met Cys Gln Gln Leu Pro Arg Leu Arg Val Leu Glu Leu

115	120	125	
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Ser His Asn Gln Ile Glu Glu Leu Pro Ser Leu His Arg Cys Gln Lys			
130	135	140	
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Leu Glu Glu Ile Gly Leu Gln His Asn Arg Ile Trp Glu Ile Gly Ala			
145	150	155	160
gac acc ttc agc cag ctg agc tcc ctg caa gcc ctg gat ctt agc tgg			528
Asp Thr Phe Ser Gln Leu Ser Ser Leu Gln Ala Leu Asp Leu Ser Trp			
165	170	175	
aac gcc atc cgg tcc atc cac cct gag gcc ttc tcc acc ctg cac tcc			576
Asn Ala Ile Arg Ser Ile His Pro Glu Ala Phe Ser Thr Leu His Ser			
180	185	190	
ctg gtc aag ctg gac ctg aca gac aac cag ctg acc aca ctg ccc ctg			624
Leu Val Lys Leu Asp Leu Thr Asp Asn Gln Leu Thr Thr Leu Pro Leu			
195	200	205	
gct gga ctt ggg ggc ttg atg cat ctg aag ctc aaa ggg aac ctt gct			672
Ala Gly Leu Gly Gly Leu Met His Leu Lys Leu Lys Gly Asn Leu Ala			
210	215	220	
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Leu Ser Gln Ala Phe Ser Lys Asp Ser Phe Pro Lys Leu Arg Ile Leu			
225	230	235	240
gag gtg cct tat gcc tac cag tgc tgt ccc tat ggg atg tgt gcc agc			768
Glu Val Pro Tyr Ala Tyr Gln Cys Cys Pro Tyr Gly Met Cys Ala Ser			
245	250	255	
ttc ttc aag gcc tct ggg cag tgg gag gct gaa gac ctt cac ctt gat			816
Phe Phe Lys Ala Ser Gly Gln Trp Glu Ala Glu Asp Leu His Leu Asp			
260	265	270	
gat gag gag tct tca aaa agg ccc ctg ggc ctc ctt gcc aga caa gca			864
Asp Glu Glu Ser Ser Lys Arg Pro Leu Gly Leu Leu Ala Arg Gln Ala			
275	280	285	
gag aac cac tat gac cag gac ctg gat gag ctc cag ctg gag atg gag			912
Glu Asn His Tyr Asp Gln Asp Leu Asp Glu Leu Gln Leu Glu Met Glu			
290	295	300	
gac tca aag cca cac ccc agt gtc cag tgt agc cct act cca ggc ccc			960
Asp Ser Lys Pro His Pro Ser Val Gln Cys Ser Pro Thr Pro Gly Pro			
305	310	315	320
ttc aag ccc tgt gag tac ctc ttt gaa agc tgg ggc atc cgc ctg gcc			1008
Phe Lys Pro Cys Glu Tyr Leu Phe Glu Ser Trp Gly Ile Arg Leu Ala			
325	330	335	
gtg tgg gcc atc gtg ttg ctc tcc gtg ctc tgc aat gga ctg gtg ctg			1056
Val Trp Ala Ile Val Leu Leu Ser Val Leu Cys Asn Gly Leu Val Leu			
340	345	350	

ctg acc gtg ttc gct ggc ggg cct gcc ccc ctg ccc ccg gtc aag ttt	1104
Leu Thr Val Phe Ala Gly Gly Pro Ala Pro Leu Pro Pro Val Lys Phe	
355 360 365	
gtg gta ggt gcg att gca ggc gcc aac acc ttg act ggc att tcc tgt	1152
Val Val Gly Ala Ile Ala Gly Ala Asn Thr Leu Thr Gly Ile Ser Cys	
370 375 380	
ggc ctt cta gcc tca gtc gat gcc ctg acc ttt ggt cag ttc tct gag	1200
Gly Leu Leu Ala Ser Val Asp Ala Leu Thr Phe Gly Gln Phe Ser Glu	
385 390 395 400	
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Tyr Gly Ala Arg Trp Glu Thr Gly Leu Gly Cys Arg Ala Thr Gly Phe	
405 410 415	
ctg gca gta ctt ggg tcg gag gca tcg gtg ctg ctg ctc act ctg gcc	1296
Leu Ala Val Leu Gly Ser Glu Ala Ser Val Leu Leu Leu Thr Leu Ala	
420 425 430	
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Ala Val Gln Cys Ser Val Ser Val Ser Cys Val Arg Ala Tyr Gly Lys	
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Ser Pro Ser Leu Gly Ser Val Arg Ala Gly Val Leu Gly Cys Leu Ala	
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ctg gca ggg ctg gcc gcc gca ctg ccc ctg gcc tca gtg gga gaa tac	1440
Leu Ala Gly Leu Ala Ala Ala Leu Pro Leu Ala Ser Val Gly Glu Tyr	
465 470 475 480	
ggg gcc tcc cca ctc tgc ctg ccc tac gcg cca cct gag ggt cag cca	1488
Gly Ala Ser Pro Leu Cys Leu Pro Tyr Ala Pro Pro Glu Gly Gln Pro	
485 490 495	
gca gcc ctg ggc ttc acc gtg gcc ctg gtg atg atg aac tcc ttc tgt	1536
Ala Ala Leu Gly Phe Thr Val Ala Leu Val Met Met Asn Ser Phe Cys	
500 505 510	
ttc ctg gtc gtg gcc ggt gcc tac atc aaa ctg tac tgt gac ctg ccg	1584
Phe Leu Val Val Ala Gly Ala Tyr Ile Lys Leu Tyr Cys Asp Leu Pro	
515 520 525	
ccg ggc gac ttt gag gcc gtg tgg gac tgc gcc atg gtg agg cac gtg	1632
Arg Gly Asp Phe Glu Ala Val Trp Asp Cys Ala Met Val Arg His Val	
530 535 540	
gcc tgg ctc atc ttc gca gac ggg ctc ctc tac tgt ccc gtg gcc ttc	1680
Ala Trp Leu Ile Phe Ala Asp Gly Leu Leu Tyr Cys Pro Val Ala Phe	
545 550 555 560	
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Leu Ser Phe Ala Ser Met Leu Gly Leu Phe Pro Val Thr Pro Glu Ala	
565 570 575	

ccg ggg ctc cgg gcg cta tgg ctt tgc gcc gcg ctg tgc gct tcc cgg 163



Pro Gly Leu Arg Ala Leu Trp Leu Cys Ala Ala Leu Cys Ala Ser Arg 20  
 5 10 15

agg gcc ggc ggc gcc ccc cag ccc ggc ccg ggg ccc acc gcc tgc ccg 211  
 Arg Ala Gly Gly Ala Pro Gln Pro Gly Pro Gly Pro Thr Ala Cys Pro 35  
 25 30

gcc ccc tgc cac tgc cag gag gac ggc atc atg ctg tct gcc gac tgc 259  
 Ala Pro Cys His Cys Gln Glu Asp Gly Ile Met Leu Ser Ala Asp Cys 50  
 40 45

tct gag ctc ggg ctg tcc gcc gtt ccg ggg gac ctg gac ccc ctg acg 307  
 Ser Glu Leu Gly Leu Ser Ala Val Pro Gly Asp Leu Asp Pro Leu Thr 65  
 55 60

gct tac ctg gac ctc agc atg aac aac ctc aca gag ctt cag cct ggc 355  
 Ala Tyr Leu Asp Leu Ser Met Asn Asn Leu Thr Glu Leu Gln Pro Gly 80  
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ctc ttc cac cac ctg cgc ttc ttg gag gag ctg cgt ctc tct ggg aac 403  
 Leu Phe His His Leu Arg Phe Leu Glu Glu Leu Arg Leu Ser Gly Asn 100  
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cat ctc tca cac atc cca gga caa gca ttc tct ggt ctc tac agc ctg 451  
 His Leu Ser His Ile Pro Gly Gln Ala Phe Ser Gly Leu Tyr Ser Leu 115  
 105 110

aaa atc ctg atg ctg cag aac aat cag ctg gga gga atc ccc gca gag 499  
 Lys Ile Leu Met Leu Gln Asn Asn Gln Leu Gly Gly Ile Pro Ala Glu 130  
 120 125

gcg ctg tgg gag ctg ccg agc ctg cag tgc ctg cgc cta gat gcc aac 547  
 Ala Leu Trp Glu Leu Pro Ser Leu Gln Ser Leu Arg Leu Asp Ala Asn 145  
 135 140

ctc atc tcc ctg gtc ccg gag agg agc ttt gag ggg ctg tcc tcc ctc 595  
 Leu Ile Ser Leu Val Pro Glu Arg Ser Phe Glu Gly Leu Ser Ser Leu 160  
 150 155

cgc cac ctc tgg ctg gac gac aat gca ctc acg gag atc cct gtc agg 643  
 Arg His Leu Trp Leu Asp Asp Asn Ala Leu Thr Glu Ile Pro Val Arg 180  
 165 170 175

gcc ctc aac aac ctc cct gcc ctg cag gcc atg acc ctg gcc ctc aac 691  
 Ala Leu Asn Asn Leu Pro Ala Leu Gln Ala Met Thr Leu Ala Leu Asn 195  
 185 190

cgc atc agc cac atc ccc gac tac gcg ttc cag aat ctc acc agc ctt 739  
 Arg Ile Ser His Ile Pro Asp Tyr Ala Phe Gln Asn Leu Thr Ser Leu 210  
 200 205

gtg gtg ctg cat ttg cat aac aac cgc atc cag cat ctg ggg acc cac 787  
 Val Val Leu His Leu His Asn Arg Ile Gln His Leu Gly Thr His 225  
 215 220

agc ttc gag ggg ctg cac aat ctg gag aca cta gac ctg aat tat aac 835  
 Ser Phe Glu Gly Leu His Asn Leu Glu Thr Leu Asp Leu Asn Tyr Asn

230	235	240	
aag ctg cag gag ttc cct gtg gcc atc cgg acc ctg ggc aga ctg cag			883
Lys Leu Gln Glu Phe Pro Val Ala Ile Arg Thr Leu Gly Arg Leu Gln			
245	250	255	260
gaa ctg ggg ttc cat aac aac aac atc aag gcc atc cca gaa aag gcc			931
Glu Leu Gly Phe His Asn Asn Asn Ile Lys Ala Ile Pro Glu Lys Ala			
265	270	275	
ttc atg ggg aac cct ctg cta cag acg ata cac ttt tat gat aac cca			979
Phe Met Gly Asn Pro Leu Leu Gln Thr Ile His Phe Tyr Asp Asn Pro			
280	285	290	
atc cag ttt gtg gga aga tcg gca ttc cag tac ctg cct aaa ctc cac			1027
Ile Gln Phe Val Gly Arg Ser Ala Phe Gln Tyr Leu Pro Lys Leu His			
295	300	305	
aca cta tct ctg aat ggt gcc atg gac atc cag gag ttt cca gat ctc			1075
Thr Leu Ser Leu Asn Gly Ala Met Asp Ile Gln Glu Phe Pro Asp Leu			
310	315	320	
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Lys Gly Thr Thr Ser Leu Glu Ile Leu Thr Leu Thr Arg Ala Gly Ile			
325	330	335	340
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Arg Leu Leu Pro Ser Gly Met Cys Gln Gln Leu Pro Arg Leu Arg Val			
345	350	355	
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Cys Gln Lys Leu Glu Glu Ile Gly Leu Gln His Asn Arg Ile Trp Glu			
375	380	385	
att gga gct gac acc ttc agc cag ctg agc tcc ctg caa gcc ctg gat			1315
Ile Gly Ala Asp Thr Phe Ser Gln Leu Ser Ser Leu Gln Ala Leu Asp			
390	395	400	
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Leu Ser Trp Asn Ala Ile Arg Ser Ile His Pro Glu Ala Phe Ser Thr			
405	410	415	420
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Leu His Ser Leu Val Lys Leu Asp Leu Thr Asp Asn Gln Leu Thr Thr			
425	430	435	
ctg ccc ctg gct gga ctt ggg ggc ttg atg cat ctg aag ctc aaa ggg			1459
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440	445	450	
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Asn Leu Ala Leu Ser Gln Ala Phe Ser Lys Asp Ser Phe Pro Lys Leu			
455	460	465	

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Arg Ile Leu Glu Val Pro Tyr Ala Tyr Gln Cys Cys Pro Tyr Gly Met	
470 475 480	
tgt gcc agc ttc ttc aag gcc tct ggg cag tgg gag gct gaa gac ctt	1603
Cys Ala Ser Phe Phe Lys Ala Ser Gly Gln Trp Glu Ala Glu Asp Leu	
485 490 495 500	
cac ctt gat gat gag gag tct tca aaa agg ccc ctg ggc ctc ctt gcc	1651
His Leu Asp Asp Glu Glu Ser Ser Lys Arg Pro Leu Gly Leu Leu Ala	
505 510 515	
aga caa gca gag aac cac tat gac cag gac ctg gat gag ctc cag ctg	1699
Arg Gln Ala Glu Asn His Tyr Asp Gln Asp Leu Asp Glu Leu Gln Leu	
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Glu Met Glu Asp Ser Lys Pro His Pro Ser Val Gln Cys Ser Pro Thr	
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Pro Gly Pro Phe Lys Pro Cys Glu Tyr Leu Phe Glu Ser Trp Gly Ile	
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Arg Leu Ala Val Trp Ala Ile Val Leu Leu Ser Val Leu Cys Asn Gly	
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Ser Ala Asp Cys Ser Glu Leu Gly Leu Ser Ala Val Pro Gly Asp Leu
    50              55              60
Asp Pro Leu Thr Ala Tyr Leu Asp Leu Ser Met Asn Asn Leu Thr Glu
    65              70              75              80
Leu Gln Pro Gly Leu Phe His His Leu Arg Phe Leu Glu Glu Leu Arg
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Leu Ser Gly Asn His Leu Ser His Ile Pro Gly Gln Ala Phe Ser Gly
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 Gly Arg Leu Gln Glu Leu Gly Phe His Asn Asn Asn Ile Lys Ala Ile  
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Ala Phe Ser Thr Leu His Ser Leu Val Lys Leu Asp Leu Thr Asp Asn  
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Gln Leu Thr Thr Leu Pro Leu Ala Gly Leu Gly Gly Leu Met His Leu  
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Lys Leu Lys Gly Asn Leu Ala Leu Ser Gln Ala Phe Ser Lys Asp Ser  
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Pro Leu Pro Pro Val Lys Phe Val Val Gly Ala Ile Ala Gly Ala Asn  
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